THE JOURNAL OF GEOGRAPHY

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ANNOUNCEMENT

THERE is an awakening of interest in geography in the schools of America, wide spread, and rapidly growing—an interest shared alike by teachers and students from the lowest grades to the university. A healthy growth is in progress, as is evidenced by the organization of a section of the National Educational Association for the benefit of geography teachers; by exhibits of geographic equipments, as at Des Moines recently; by the multiplication and improvement of texts and supplementary reading books; by the offering of courses, and the establishment of chairs of geography in various universities; and lastly, by the successful growth of various magazines especially devoted to geography. Two of these journals, each successful and rapidly growing, have recently combined, with a high appreciation of the needs of geography in our schools, and will attempt, by the concentration of energy in one journal, to become a stronger factor in the future healthy development of the science.

The three responsible editors will be assisted by a large corps of associate editors, who are active workers in the common field, and who represent, with something of the concentration of specialists, the wide range of interests involved in the general field of geography.

The JOURNAL OF GEOGRAPHY is planned to meet the needs of all the teachers and students in geography, in every grade and in every phase of special treatment. More than half our space will be devoted to original articles, from the pens of eminent geographers, teachers, and travellers, with a constant attempt to furnish live and trenchant material in current fact and theory, and in the special

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problems helpful to the wide-awake teacher in the business of the class room.

A very strong feature of the magazine will be the department called "Geography Current," in which an effort will be made to record in notes and brief articles the growth and change in the various special sciences and lines of research, which furnish the bone and tissue for the body of general geography. Each definite field will be in charge of specialists in that field, who will keep a careful account of current growth, and record it in signed notes and briefer articles. It will be the constant aim of these specialists to state their problems in easy terms, setting forth the important elements in an interesting manner, so that growing students who are not specialists may grasp the principles which furnish the common bond between the somewhat diverse lines of research possible within the whole field of geography, and so be furnished the materials for developing a wide range of interests, and a broad outlook upon the world.

The special fields proposed for "Geography Current" in this attempt to furnish a common bond for the sister sciences, are:

Astronomy.—In which the positions of the planets and other heavenly bodies will be described, so that beginners may follow the heavens from month to month with an intelligent guide. Events of special interest, such as eclipses, will be discussed suggestively in time for observation. A series of brief illustrated articles will be given on the various constellations, helping beginners to locate them, and giving the legends and beliefs clustering round them through the ages.

Geodesy and Cartography.—Notes on the progress in refined earth measurement, explorations and surveys. An attempt to record, with helpful comment, the publication of current maps and atlases, from all sources, but especially those issuing so lavishly from our own government bureaus.

Physiography of the Lands.—Helpful summaries of current literature concerning the interpretation of the surface of the lands, with suggestions as to the teaching of the agents and processes of earth sculpture, with a proper appreciation of the significance of land forms.

Climatology.—Progress in meteorology, and the interpretation of special regional climatic conditions; always keeping prominent the influence of climate as conditioning life.

Hydrography.—Notes on the survey of the oceans, and the waters of the land; the study of oceanic circulation, currents and waves; of harbors, and of the navigation of streams; the use of water in domestic supply and for power and irrigation.

Phytogeography.—Notes on the geography of plants, their distribution and interrelation, and on plants as furnishing the raw materials of commerce. This includes economic botany, in its various phases from crops to forests.

Zoögeography.—Observations on the geographic distribution of animals, including the human influence in extending the distribution of species; the discovery of new species, and the preservation of those liable to extinction. A careful watch will be kept of the magnificent work in progress along these lines in the United States Bureau of Animal Industry.

Anthropogeography.—The study of peoples in their geographic distribution and interrelations, and their characters and social conditions as conditioned by geographic environment.

Economic Geography.—Notes on the ways in which men take advantage of their geographic environment in their economic development. The interests of mining, lumbering and cultivation; and the problems of transportation and manufacture.

Political Geography.—A careful record of changes in sovereignty, establishment of boundary lines, government encouragement or restriction of commerce and industry.

Geography Teaching.—The interests of this department will be carefully served. Several associate editors are directly interested here—men whose business it is to teach teachers, or to supervise geography work in large schools. No effort will be spared to furnish the latest and most helpful suggestions to teachers, especially those in elementary and secondary education. Teachers having special difficulties or desiring information on any geographic topic are invited to correspond with the editors; each question will be answered by letter and every difficulty will be submitted to an expert in the line to which it pertains.

The editors hope to secure the coöperation of all the leading geographical societies, making the JOURNAL a medium for the exchange of ideas, and for mutual help.

The AMERICAN BUREAU OF GEOGRAPHY, an institution which in its two years of existence has proven its great value to a widespread constituency, will be continued more actively than ever, and under

the special care of an expert in the collection and exchange of photographs and products helpful to teacher and student alike.

The editors are keenly conscious of the magnitude of the work to be done in America in advancing geographical education and will spare no effort to make the JOURNAL the best help available to the teacher in every grade. To this end the coöperation of all workers in the broad field of geography is earnestly invited.

USEFUL PRODUCTS OF THE CENTURY PLANT

A LESSON ON MEXICO*

BY WILLIAM B. MARSHALL, FORMER CURATOR OF THE PHILADELPHIA COMMERCIAL MUSEUMS.

IN recent years Mexico has become a progressive country, and, although not ranked among the great powers, it has taken an honored place among the nations of the world. Its people come into contact with the rest of the world in nearly as many ways as do the people of the United States, but in lesser degree. The foreign commerce of Mexico, represented by the value of its imports and exports, already large, is increasing in importance each year.

The principal materials imported into Mexico are machinery, cotton textiles, iron and steel, wines and liquors, wool textiles, paper, textile fibres. Mexican capitalists and industrial leaders are making efforts to manufacture more and more of these materials in Mexico, in order to gain the profits from their manufacture, give employment to a greater number of their people, lessen the cost of the goods, and keep in Mexico the money that must be paid for them. The chief exports of Mexico are silver, henequen, gold, coffee, cattle, copper, lead, hides, precious woods, and zacaton root; the values of which are usually about as in the order given. In the production of silver Mexico contests first place with the United States. She produces all the henequen of commerce.

*Continued from the December Bulletin of the American Bureau of Geography. Vol. II., No. 4, p. 328. The author is indebted to the McCormick Harvesting Machine Co., Chicago, for the illustrations accompanying this article.

Henequen (pronounced hen'e-ken) is a coarse vegetable fibre from three to five feet long. Its color is pale yellow, nearly white. In Mexico the fibre is known by many names, the correct one and that most commonly used being henequen.* In the United States it is often called henequen, but more commonly sisal (pronounced sis'al) or sisal grass, or sisal hemp. The name sisal is given it because it was formerly exported from the port of Sisal on the northern coast of Yucatan.

The plant which yields sisal fibre is a species of agave (pronounced ah-ga'va) or century plant, known to the botanists as *Agave rigida sisalana*. When growing in our greenhouses we refer to it as *a* century plant, but not as *the* century plant. It is very similar to the common century plant and belongs to the same group or order of plants (*Amaryllidaceæ*), all of which, although there are about 125 species, resemble each other in a general way, just as all species of violets resemble each other. The full grown sisal plant has a thick stalk about three or four feet high, bearing at the top a number of long, broad, stout, fleshy leaves, with short, sharp spines along both edges, and a longer sharper spine at the tip. The flowers, of which there are several thousand, are borne on horizontal branches near the top of a pole-like flower-stalk from 20 to 30 feet high. The stalk and flowers resemble a tall candelabrum with numerous brackets each bearing hundreds of lights. The fibre occurs as threads running the entire length of the leaf from the base to the apex. It is embedded in a great amount of white pulp.

THE PRODUCTION OF THE FIBRE.

The sisal plant grows wild in many parts of Mexico and Central America, being hardy and able to thrive in many places where the soil is too poor to support other vegetation. Because of its com-

*There is much confusion regarding the names applied to this fibre. Henequen is used in a generic sense to include all the long agave fibres grown in southern Mexico. In a restricted sense it is applied to a finer, whiter fibre than that usually designated as sisal. There is some doubt as to whether the sisal and henequen are yielded by different species of agave or by different agricultural varieties.

Maguey is a term used in a generic sense to designate various species of agave and the products obtained from them. In a restricted sense maguey is applied to the sap-yielding varieties. *Ixtle* is a term used to designate the short varieties of agave fibre and is applied also to the fibre of various other plants.

FIG. 2. THE LARGE PLANTATIONS ARE TRAVERSED BY TRAMWAYS ON WHICH FLAT CARS DRAWN BY BURROS ARE LOADED WITH BUNDLES OF LEAVES TO BE TAKEN TO THE FACTORY.

mercial importance, regularity in the supply of the fibre is necessary to meet the demands of manufacturers; hence but little dependence is placed upon the wild plants as a source of supply. Nearly all the sisal used is grown on large plantations devoted to its cultivation.

The young plants may be grown from seeds, or from pole-plants, *i. e.*, young plants which form on the branches of the flower-stalk and drop to the earth and take root; but the method of propagation universally adopted is to transplant the suckers or shoots which spring up about the mother plant. The young plants are set out in rows from six to ten feet apart. A less distance between the rows would render the plantation almost inaccessible because of the sharp spines with which the leaves are armed, and which often inflict serious wounds on the laborers. At the end of five years the first crop, consisting of eight or ten leaves from each plant, is harvested. For about twelve to fifteen years after this each plant yields about a dozen leaves per year, then dies and is replaced by a young plant. The labor is performed by Mexican Indians, usually under the direction of white overseers. The leaves are cut close to the stalk of the plant, with a curved knife fastened in the end of a handle about twelve inches long. (See frontispiece.)

As each leaf is gathered it is trimmed along both edges to remove the prickles, and the stout spine at the tip is cut away. The leaves are then made up into bundles called *pencas*. On small plantations these bundles are removed from the field on the backs of men or burros. The large plantations are traversed by tram-ways on which flat cars drawn by burros are run to all parts of the fields to be loaded with bundles of leaves to be taken to the factory.

On a small scale the fibre is extracted by macerating the leaves in water to soften the pulp, which may then be easily scratched or combed away. In the factories the work is done on a large scale by various types of machinery, all of which first crush the pulp and then scratch or comb it away from the fibre. After the fibre is extracted it is dried in the open air. The drying yards have in them a great number of posts planted in the ground, with pieces nailed near the top forming crosses on which the fibre is looped; or the posts are connected by a number of rails over which the fibre is hung. When dry the fibre is baled in powerful presses in order to make it more convenient in handling, storing and shipping.

Yucatan is the great sisal growing region—especially the portion of it surrounding the capital, Merida. In this district the sisal plant

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is almost the only vegetation. Several towns, notably Merida and Progreso, the port from which sisal is exported, are wholly dependent upon this industry. Were it not for this industry the whole north-western portion of Yucatan would be deserted.

FIG. 3. THE DRYING YARDS HAVE IN THEM A GREAT NUMBER OF POSTS CONNECTED BY NUMBERS OF POLES OVER WHICH THE FIBER IS HUNG.

"Thanks to its trade in henequen, or agave fibre, of which from 40,000 to 60,000 tons are annually exported, Merida has become the

converging point of several lines, which, when completed, will cover the whole peninsula with a net-work of railways. For the present, however, the capital is connected only by a road with its ancient port, the little town of Sisal, at the northwest corner of Yucatan. From this sea-port the henequen takes its English name of sisal hemp, by which it is known to the trade. The price of this valuable fibre has increased six-fold since the middle of the present century. The roadstead of Sisal being exposed to the dangerous north winds was abandoned in 1871, when a new *marina* was founded on the coast due north of Merida, with which it is connected by a railway twenty-two miles long. The line is carried over the coast lagoon by a strong embankment. The new town, which replaces the old Indian village of Tuxula, has already justified its name of *Progreso,* although the only advantage it enjoys over Sisal is its relative proximity to the capital. To shipping it is equally inaccessible, large vessels having to anchor in an open roadstead from three to six miles from port. So dangerous is the roadstead that steamers and sailing vessels are always ready to weigh anchor and escape to the high sea. Towards noon every day communication with the shore becomes almost impossible, owing to the violence of the surf under the action of the fierce northern gales.''—''The Earth and Its Inhabitants,'' Elisée Reclus, 1891, D. Appleton & Co., N. Y.

EXPORT AND MANUFACTURE OF THE FIBRE.

The United States takes nearly all the sisal hemp exported. Several large manufacturing establishments in this country maintain agencies in Yucatan for the purpose of purchasing the fibre, and keeping thoroughly informed as to the condition of the trade, the probable supply and possible variation in price.

Sisal hemp is one of the few important raw materials of the cordage industry in the United States and almost the whole quantity imported is used for making ropes and binding twines. In Philadelphia and other cities there are extensive cordage works which annually use large quantities of this fibre. Much of the binding twine used on harvesting machines to bind the grain into sheaves as it is cut, is made of sisal. Some of the great establishments which make these harvesting machines, notably the great works located in Chicago, have their own twine mills employing hundreds of men and women, and their twines are sold in all parts of the world wherever modern agricultural machinery is in use.

Manila hemp of the Philippine Islands is almost its only competitor in the binding twine factories. In the cordage factories Manila hemp, sisal hemp, flax, common hemp, cotton and jute are

the fibres commonly used. Sisal is preferred for certain uses and because of its price and because of special demand in certain markets in which it is to be sold. For other uses it is not so good and is displaced by other fibres.

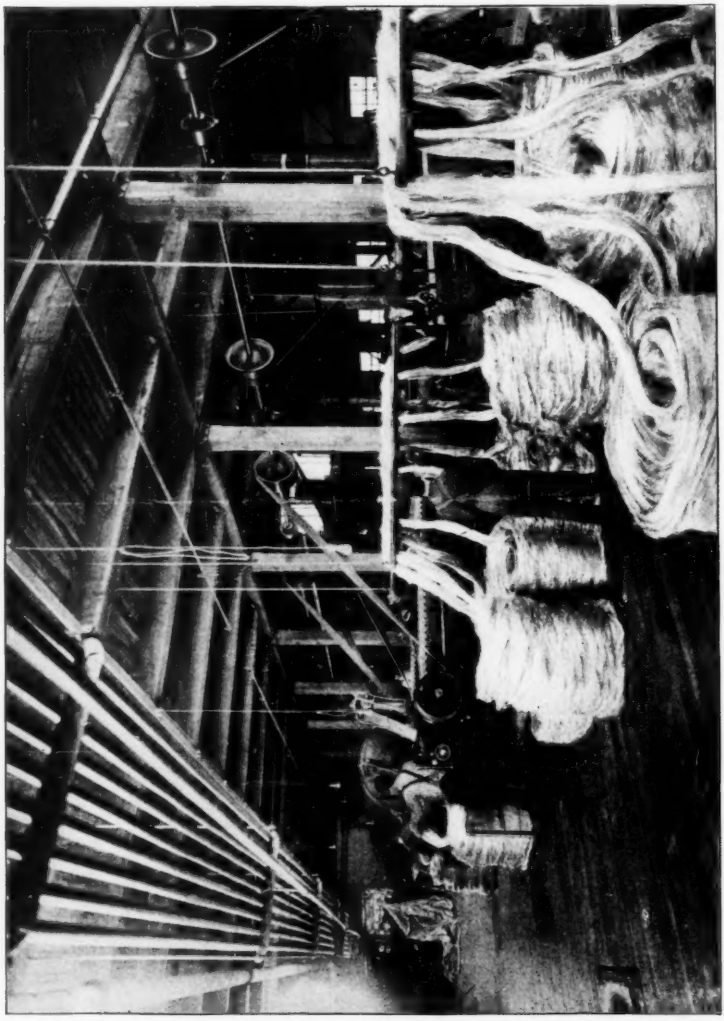

FIG. 4. PREPARATION ROOM IN THE MCCORMICK MILLS AT CHICAGO. FIRST PROCESS IN PREPARING THE FIBER FOR SPINNING.

All the fibre produced is not exported from Mexico, but a very large part is retained for home consumption, being made into a great variety of articles which are in everyday use in all parts of the country. Twines, ropes, matting, bagging, hammocks, sandals, harness, baskets and ornaments are the principal articles made in Mexico from sisal. Rarely are any of these articles sent to the United States except as curios.*

Tampico hemp, so named because it is exported from the port of Tampico in the State of Tamaulipas on the Gulf coast, is a shorter stiffer fibre obtained from another species of century plant. San Luis Potosi is the centre of the district in which this fibre is grown. The same name is given also to a fibre from a species of yucca. Tampico hemp is used for making brushes of various kinds, and for door-mats.

PULQUE, THE NATIONAL DRINK.

Several species are important because of their sap, which is used for making pulque, mezcal and some other liquors of less importance. These plants are known as the pulque agaves (pronounced pool'ka) and mezcal agaves. The common century plant of our greenhouses is one of the most important of the pulque agaves.

The pulque agaves are cultivated on the plateaus and in nearly all parts of the mountainous districts at from 6,000 to 8,000 feet above sea-level, but the vicinity of the City of Mexico is the great centre of the pulque industry. For a distance of about sixty miles on all sides of the capital city there are immense pulque plantations, many of them containing thousands of acres of land. Many small

*"Shoes in Mexico are a foreign innovation, and properly form no part of the national costume. The great majority of the people do not wear shoes at all, and probably never will; but in their place use sandals, composed of a sole of leather rawhide, or plaited fibres of the maguey plant, fastened to the foot with strings of the same material, as the only protection for the foot needed in their warm, dry climate. And these sandals are so easily made and repaired that every Mexican peasant, no matter what may be his other occupation, is always his own shoemaker. As a general rule also, the infantry regiments of Mexico wear sandals in preference to shoes; 'not solely for the sake of economy, but because they are considered healthier, keep the feet in better condition, are more easily repaired or replaced, and make the marching easier.' Very curiously the pegged shoes of the United States and other countries are not made and cannot be sold in Mexico, as owing to the extreme dryness of the atmosphere, the wood shrinks to such a degree that the pegs speedily become loose and fall out."—"A Study of Mexico," by David A. Wells. D. Appleton & Co., New York, 1887.

farms also are wholly or partially devoted to raising the pulque agave; and many families who do not make a business of growing

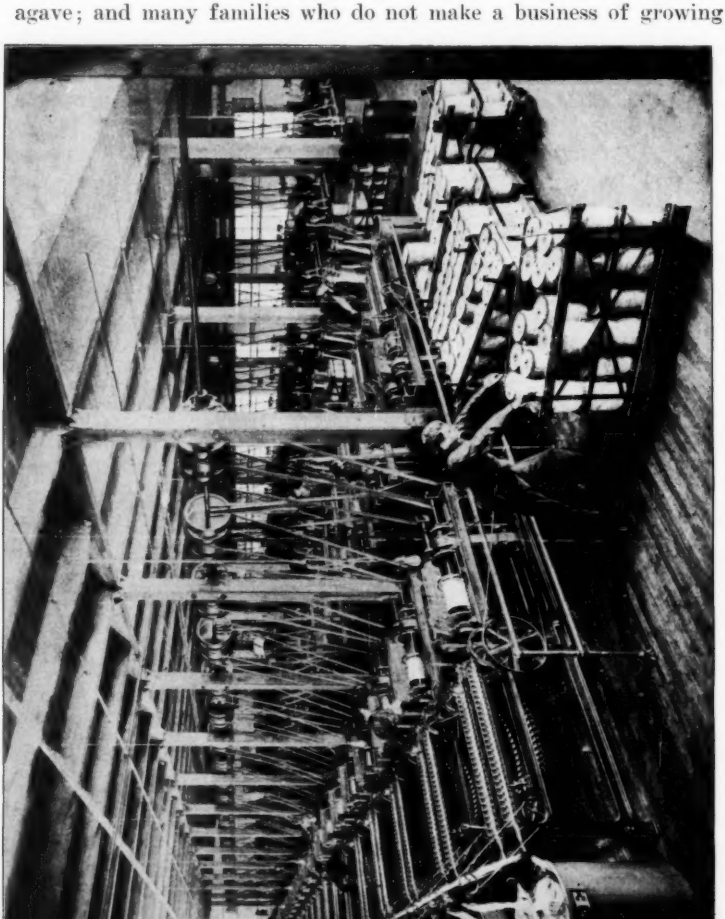

FIG. 5. ONE OF THE FIVE SPINNING LOOMS IN THE GREAT McCORMICK TWINE MILLS.

the plant keep a few growing in their door-yards from which to obtain their own supply of pulque.

The pulque agaves are cultivated in the some manner as the sisal agaves. When ready to bloom the plant produces large quantities of sap which, under ordinary conditions, would go to form the tall stout flower-pole and flowers. But the "pulquero," *i. e.*, the sap-gatherer, cuts out the bud and the rosette of leaves in which it nestles and scoops out a hollow in the top of the plant. Into this hollow a great amount of sweet, greenish, yellowish or whitish juice exudes. This juice is called *aguamiel*, meaning honey water, and is much liked. The flow continues for three or four months, some plants yielding as much as two gallons per day. The pulquero visits each plant at least twice a day to collect the sap. The sap is drawn by suction into a long gourd and is then emptied into a pig-skin bag carried on the back of the pulquero or on the back of a burro. Each day the sides of the hollow in which the sap is collected are scraped in order to permit free exudation. But small quantities of *aguamiel* are consumed because it so rapidly ferments that transportation to the cities is almost impossible. When fermented it is called pulque. The usual method of fermenting is to add an equal amount of milk and a small quantity of rennet, pour the mixture into vats made of raw cow-skins and allow it to stand about thirty-six hours. It curdles somewhat and resembles thin buttermilk, has an unpleasant odor like partially decayed meat or rancid cheese and tastes like stale buttermilk. Persons unaccustomed to its use find it at first disgusting and nauseating, but soon acquire a taste for it and find it palatable and refreshing. Taken in large quantities it is intoxicating. It contains about 7 per cent. alcohol.

Pulque is the national drink of the Mexicans, just as beer is the national drink of the Germans, or as wine is the national drink of the French. Large areas of land and many thousands of laborers are devoted to its production. The railroads of the pulque district run daily pulque trains to the city of Mexico, and to other parts of the country, and large quantities are carried on the backs of burros into the capital and other cities in the pulque district. The City of Mexico has about one thousand "pulqueras" or "cantinas," *i. e.*, saloons, in which nothing but pulque is sold. The daily consumption in that city exceeds 50,000 pints.

Another product of agave is mezcal, a clear, strongly alcoholic liquor made by distilling the sap of various species of agave. The pulque agaves may be used for the purpose, but most of the mezcal is distilled from the juice of other species which are called mezcal

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agaves or mezcal magueys. These plants have thinner and narrower leaves than the pulque agaves. Mezcal is called also *mexcal, aguardiente de maguey,* and *tequila.* In English it is often called Mexican brandy. Its taste resembles that of strong rum. It is extremely intoxicating and brutalizing. Large quantities are consumed throughout Mexico and it is one of the national drinks. The entire product of pulque and mezcal is consumed in Mexico.

Vinegar is made by rapidly fermenting the sap. When completely evaporated the sap yields sugar; partially evaporated it yields a sweet, honey-like syrup.

The pulque and mezcal agaves yield fibre similar but much inferior to that of the sisal agaves. The plants are grown almost exclusively for the sap products. What fibre is extracted is used locally.

A WIDE VARIETY OF PRODUCTS.

The fibre and the sap are the most important products of these plants and it is for these that they are cultivated. But there are many other uses for which the plant itself and its products, and the by-products and wastes of the fibre-extracting mills are adapted. The waste fibre of the mills is used for oakum and as packing material, and can be used for making coarse paper. A handful of the waste serves as a toilet sponge and is quite commonly used in this way. The sharp spine at the tip of the leaf is often used as a nail. With a strand of fibre left attached to it, it serves as a threaded needle and is much used for sewing up bagging, repairing harness, sandals, etc. The flower-stalks are used for fishing poles, lance handles, razor strops and for constructing the walls of huts. The leaves are used as fodder and to thatch huts. The roots and leaves of several species, especially *Agave saponaria* are used as soap substitutes.

The plants are much used in Mexico for hedges, and in many parts of the world in ornamental gardening.

STATISTICS OF OUR IMPORTS.

During the year ending June 30, 1900, the principal fibres imported into the United States were valued at $11,782,263, which was distributed among the various fibres as shown in the following table.

U. S. IMPORTATIONS OF FIBRE FOR THE YEAR ENDING JUNE 30, 1900.

	Tons.	Dollars.
Sisal	76,921	11,782,263
Manila	42,624	7,172,368
Jute and Jute Butts	102,694	3,956,413
Flax	6,967	1,646,274
Istle or Tampico	5,748	475,090
Hemp	3,400	450,269
All other	10,953	891,128
	249,307	26,373,805

The most of the Mexican fibre comes to the port of New York, though Boston, Mobile and Baltimore are large buyers.

FIELD WORK IN PHYSICAL GEOGRAPHY

I

BY PROFESSOR W. M. DAVIS, HARVARD UNIVERSITY.

NORMAL SCHOOL, RANDOLPH CENTRE, VERMONT.
May 20, 1901.

PROFESSOR W. M. DAVIS,
Cambridge, Mass.

Dear Sir: Having noted your interest in the teaching of Physical Geography in Secondary Schools, I take the liberty of asking you one or two questions concerning field work in this branch. How shall the field work given in Physical Geography differ from that given in Geology? * * I feel somewhat at home in conducting a field excursion in Geology, but if I understand the present trend of Physical Geography correctly, it is to call attention to a different class of phenomena as observed in outdoor work, and I do not understand clearly how to bring out this difference in conducting field excursions. * * *

Sincerely yours,
GILBERT H. TRAFTON.

(A brief answer was sent to Mr. Trafton's question last May, and during the summer the following longer consideration of the matter was written out for publication in the JOURNAL, in the hope that it might prove generally serviceable. W. M. D.)

August, 1901.

THE point raised by Mr. Trafton is one that needs fuller discussion than is usually allowed, especially now that physical geography is coming to receive more serious attention than it has had in the past. Some aid towards a solution of the problem may perhaps be found in the following suggestions.

Let us inquire in the first place as to the proper fields of these two allied studies, Geography and Geology. Geography is the study of the earth in its existing condition and in relation to man (and life in general); and physical geography, or physiography, is the physical, rational, explanatory study of those existing features of the earth that enter into this relation. Geology, on the other hand, is the historical study of the earth, and physical geology is the study of the processes whereby changes have been brought about with the progress of time. It may be reasonably maintained that geography is merely the existing phase of geology, and that all geology is made up of a long series of past geographies. For our present discussion it suffices to recognize that geology is chiefly concerned with the past, while geography is concerned with the present; and it is interesting to note that each subject thus becomes largely dependent on the other: the processes of the past are best learned by studying those of the present; while the conditions of the present are best appreciated by studying their evolution from those of the past. Mackinder has phrased this very happily: "Geology is the study of the past in the light of the present, while geography is the study of the present in the light of the past."

But in the second place it is curious to notice that the physical study of the existing earth has been relatively neglected by geographers and cultivated by geologists. This is particularly true of the second half of the last century. Various reasons led to this peculiar distribution of responsibilities. Professional training has not been required of geographers; geography is ordinarily "finished" in school; it has seldom been treated seriously by colleges and universities in the United States and in Great Britain; and when offered by the universities of continental Europe it has been very largely directed toward historical geography and history, while the scientific aspects of the subject have generally been neglected. Geology has, on the other hand, long been recognized as a scientific subject; it is sometimes begun in school years, but no one would be considered a well-trained geologist who has not studied his subject in college, and gained some observational experience in the field. The member-

ship of the various geographical and geological societies reflects this condition of things very clearly. The geographical societies have large membership lists, to which any reputable person who is willing to pay the annual dues is readily elected. The addresses read at the society meetings and published in the geographical journals are in a majority of instances hardly more than personal narratives of travel, with subordinate regard to the scientific aspects of the subject, that is, with but scanty consideration of the elements of physical environment as the controls of man's ways of doing things, and little attention to man's ways of doing things as a response to the elements of his physical environment. The mere fact that a man of some intelligence has traveled to a remote part of the world suffices to give him the title of "geographer," in the sense that he is then regarded as well qualified for membership in a geographical society, and that his narrative is acceptable as a contribution to geographical literature. It is quite different in geological societies: their membership is more limited; serious professional preparation and accomplishment is often required as a qualification for election. Personal narratives make no significant share of geological publications, which are as a rule devoted strictly to scientific topics.

Under these conditions, it is most natural that the two chief advances in geography for the past hundred years should not have been made by geographers: the recognition of physiographic evolution has come from geologists, and of biologic evolution from biologists. Thus geography, in which man should be considered as having come to act his present part in consequence of having learned to act on the earth, with all its variety of scenery, of climate, of products, is necessarily a composite subject; so composite, indeed, that some fail to see the unifying principle by which its parts are welded together; so composite that few students cover all its broad field with sufficient thoroughness really to deserve the title of "geographer." The subject being unusually broad, and the preparation for it usually being narrow, it is little wonder that many topics of physical geography have been treated by geologists as if they were purely geological, instead of forming the common ground of both subjects, and therefore most appropriately introduced in that one of the two studies which is ordinarily met the earlier. Let us consider some specific instances of this.

Soil is the product of weathering and erosion on the surface of the earth's rocky crust. These destructive processes are going on

to-day much as they always have; they are as appropriately geographical as the running of a river or the blowing of a wind; the soil cover of the under rocks, on which plant growth so generally depends, is to geography as important as a valley or a delta; yet weathering, transportation of waste, the character and origin of soils, are usually treated as if they belonged to geology alone. So habitual is this association that many a teacher of geography is disconcerted on encountering a consideration of these important physiographic topics in a text-book, and says, "This is geological material not geographical." The geographical treatment of rivers hardly ever gives adequate accounts of them as waste carriers and valley carvers. If the important subject of land sculpture is considered at all, it is too often treated in a hesitating, half-hearted way; narrow gorges and cañons, in which the work of erosion is truly very evident, yet only just begun, are cited as standard examples of the magnitude of such work, while nothing at all is said of plains of denudation, in which the work of erosion is well finished, even though proclaimed only with a silent eloquence. Indeed, the explanatory method of treatment, always considered appropriate when temperature and rainfall, ocean currents and tides, are discussed, has until late years been practically overlooked when land forms are reached. It is held to be orthodox to give a reason for the path of an isotherm, or for the course of a prevalent wind, but it is looked upon as rather heterodox and "geological" to give a rational treatment to anything like the course of a river or the pattern of a coast line; it is forgotten that many a river and many a coast line may be modern affairs compared to the isotherm and the wind, whose general courses may have been established ages ago.

The moral of all this is that in physical geography, as in physical geology, a rational treatment should be uniformly distributed over all the divisions of the subject. The treatment of rivers and coast lines is empirical in many books on physical geography; if this treatment is changed for an explanatory one, the subject is thereby made rational, but it is not made unduly geological. To consider it so would be no more reasonable than to consider a text-book of geology unduly geographical because the processes of to-day are there set forth as guides to those of the past. Let no teacher therefore hesitate to introduce reasonable explanations for any topics that are properly included under the subject in hand, whether it is geology or geography; and let no one, teacher, superintendent, or layman, attempt

to separate these two subjects by according a rational, scientific treatment to the first and an antiquated empirical treatment to the second.

Now let us see if the preceding paragraphs have a practical bearing on the question in hand.

The character of the practical exercises in a course in physical geography that follows a course on geology will be very different from that in one which precedes a course in geology, or which stands alone. The first of these arrangements is so unadvisable that it need not be considered; the second is common enough for those students who go to colleges after finishing a high-school course; the third is still more common, and will remain so for years to come; hence the third alone will be considered here. Furthermore, as our correspondent's question deals only with those practical exercises which are involved in field work, laboratory exercises will not here be discussed. The problem is thus narrowed down to the selection of outdoor exercises in physical geography, for a class of students who have not studied, and who may never study geology. It is still further narrowed by the implication of our correspondent's letter that exercises concerning the earth as a globe, the atmosphere, and the ocean are not at present in consideration, and hence that exercises on the lands, where physical geography and physical geology run so close together, are alone to be examined.

The first point to bear in mind is that the exercises should be so planned as to lead towards their object, namely, a real understanding of the existing lands on which we live, with particular attention to those elements which are of consequence as environments, controlling our way of living. This at once makes a distinction between exercises for a course on physical geography, and for one on physical geology, even though the exercises lead over the same paths, and stop at the same places; for exercises in geology have as their chief object the interpretation of the past history of the earth through its present condition, and this object should always be borne in mind, if geology and not geography is to be taught. It may be noted, however, that as the history of the past can not be really understood until the processes of the present are made familiar, it is eminently appropriate that physiographic field work, in which emphasis is laid on present conditions, should precede geologic field work, which is laid on the sequence of past events. It was with this principle in mind that the Committee of Ten recommended some years ago the post-

ponement of geology to the college course, and the general introduction of practical exercises as a part of physical geography in the high school course.

Another important point is that field exercises in the autumn, when the text-book work is only just opening, should relate to general characteristics of the lands as illustrated by specific facts; and that the study of different kinds of land forms should be as a rule postponed to spring excursions, after a larger view of the subject has been acquired through the winter months. Let the students then be asked in September and October to look about them, to try to discover what are the most general characteristics of the lands, and where and how they may be best illustrated by local examples. At the close of field exercises running through two fall months, it should have been observed, or reasonably inferred, that the lands are those parts of the earth's rocky crust that rise above the seas, and that are thereby directly exposed to sunshine, to atmospheric action, and to stream work (thus being strongly contrasted with the sea floors); that in consequence of this exposure the land surface is under changing conditions of light and darkness, of heat and cold, of aridity and humidity, of movement and rest, of chemical and organic processes; that chief among the consequences of these activities is the progressive disintegration of the surface rocks, thus forming rock waste and soil, and the progressive down-slope removal of the waste from higher to lower ground, and ultimately to the ocean; or in brief, that the waste of the land is the gain of the sea; that the action of rain-, snow- and spring-fed streams is particularly important in the transportation of waste, to such a degree that the pathway of the streams is usually worn down below the adjacent land surface, just as a much used and poorly cared-for road is worn down; but with the notable differences, that while the road may go up and down hill, the pathway or channel of the streams is always down hill, and that while roads may run cross-wise and form a network, streams tend to join each other and thus form a branch-work.

While local observations are accumulating, it is for the teacher to emphasize their importance by telling something of the results of observation elsewhere. Rocks, weather, soil, wash, streams, valleys, and hills are of world-wide distribution. They all vary in many respects from place to place over the lands, yet they all maintain their essential characteristics. The capacity to see facts of these kinds can

be acquired almost anywhere and utilized almost everywhere. It is of the utmost importance that this aspect of home field study and its relation to the study of the world should be appreciated. Just as soon as a group of home facts is well apprehended and generalized let the teacher confirm its value by telling something of the wide distribution of such facts over the world, instancing examples where their value is greater or less than, or equal to their home value. Local field work may be greatly enriched in this way.

During the establishment of the fundamental generalizations, special attention may be given to some of the commoner minerals and rocks in the local field, and to the manner in which they are disintegrated, but the study of mineralogy as such should be set aside for another occasion. Familiarity should be gained with the processes whereby the disintegrating rock waste creeps and washes down hill to the streams, constantly removed and constantly renewed, and whereby the streams comminute the waste and transport it along their valleys toward the sea; attention should be given to the forms assumed by the waste of the land on its way to the sea, and the use made of the slowly moving waste by plants and animals. Gradually the great generalization may be reached that if destructive processes of these kinds go on forever, the lands would in time be worn to nearly featureless lowlands, close to sea level; and that this result would already have been reached had the crust of the earth stood still from the beginning: and then follows the reasonable inference that, inasmuch as the lands still possess abundant relief, the earth's crust cannot always have stood still; it must have changed position, perhaps slowly rising and falling, now here, now there; and then it dawns upon the inquiring student that the lands possess their present forms because they have for ages been the theater of the opposing processes of deformation and denudation; that every part of the lands may be supposed to owe its existing form to the stage now reached by the processes of denudation in overcoming the work of deformation, and that no better way of describing a land form can be found than to explain it in terms of its origin; thus the essential principle of the geographical cycle is reached, and a sound foundation is laid for all further work. Truly, it still remains to demonstrate the correctness of all these inferences and suppositions, but real demonstration is, I fear, not to be accomplished in the time allowed for school exercises, and with students of the age appropriate to the exercises here considered. Demonstration may be

quoted, if desired, in abundance, but the most that can be expected in the way of first-hand work is to show that the conclusions here announced are reasonable; and on this foundation, text-book work may proceed with good effect through the winter.

It should be clearly understood that work of this kind is not limited merely to matters of observation and record. These are truly the first steps, but they must be followed by abundant thinking; indeed, the soul of the work is gained only when the thinking that is inspired by the observations is logical, searching, critical. It is chiefly by this means that a sound disciplinary value is added to outdoor exercises, and that they become essentially scientific; for we here take it to be understood that observation is by no means the whole of science, although it is an essential part thereof. The thought as well as the facts should be written out; but inference and argument should be carefully separated from observation and generalization. Thus the work may be made as rigorous as is desired, and its educational value may be made second to none; but much progress must be made in our schools before this ideal is reached.

Let it be here noted that field work of the kind above suggested is entirely out of reach of a teacher inexperienced in the field. It is nothing more than a travesty of observational exercises that is gained when they are conducted by a teacher who can not "walk alone" in comfort out of doors. Hence when superintendents wish to introduce work of this kind, it is incumbent upon them to engage a teacher who is competent to conduct it. The acceptance of an unprepared candidate is demoralizing in more ways than one: not only will the educative and disciplinary elements of field physiography be greatly weakened, but those conscientious students who are preparing themselves to teach real physiography by devoting a good share of time to the study of the subject will be discouraged by seeing that ill-prepared candidates gain responsible positions. This is to-day a serious difficulty, and it lies more with superintendents than with any one else to correct it.

(To be continued.)

THE TRADE AND INDUSTRIES OF WESTERN SOUTH AMERICA*

I

BY EMORY R. JOHNSON, ASSISTANT PROFESSOR OF TRANSPORTATION AND COMMERCE, UNIVERSITY OF PENNSYLVANIA.

SOUTH AMERICA is but slightly smaller than North America. It is wider between Pernambuco and Guayaquil than the United States between Oregon and Maine, long enough to reach from the Isthmian Canal to Baffin Bay, a thousand miles beyond the southern point of Greenland, yet none of her shores are frozen. These rather surprising dimensions are seen more clearly by a glance at a globe, which will correct the erroneous impressions that flat maps make by exaggerating the size of the countries of high latitude and diminishing the area of equatorial regions. Viewed on a wall map, North America appears much larger than South America, when in reality there is but slight difference in the area of the continents. A map on the polyconic projection shows clearly the relative areas of the two continents.†

Brazil alone is larger than the combined area of England, France, and the United States, exclusive of Alaska; while each of five other South American Republics exceeds in area the original thirteen States of North America, with Maine, Vermont and Florida added; and the State of Massachusetts with its irregular shape could be completely hidden away by being put down in the midst of the unexplored areas of the great forests of the Amazon valley. Although

* The paper of which this article is the first third will appear as Chapter XI. of the Report on the Industrial and Commercial Value of an Isthmian Canal, to be published as an Appendix to the Final Report of the United States Isthmian Canal Commission. In the preparation of the chapter the author was greatly aided by Mr. J. Russell Smith, who served for two years as Clerk to the Committee on the Value of the Canal—one of five Committees by means of which the Canal Commission prosecuted its investigations.

†Such a map will be published as Plate 75 in the report of the Isthmian Canal Commission.

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large, South America does not have a greater proportion of worthless territory than have most of the other continents. There are deserts in Peru and Chile, and mountain wastes and swampy forests in the centre of the continent; but these areas are small compared with the unoccupiable parts of North America. Canada and Alaska, comprising a third of the continent, are largely uninhabitable because of the cold climate. The plains and plateaus west of the Missouri river embrace a third of the territory of the United States that can be only sparsely inhabited because of its aridity. The proportion of arid land in Mexico is greater than in the United States.

In South America, the present sparse population has but touched the resources that can support commonwealths as populous as those of Europe when immigration and settlement shall have occupied the country. The present sparseness of population and backward development of South America are due to three causes. The first is the difference in character of the races inhabiting England and Spain—a difference as marked in their colonies as in the mother countries. England and her colonies have prospered, while Spain and her dependencies have languished. Had England, not Spain, possessed South America after the sixteenth century, the continent would now be more highly developed, although its social institutions might have differed from those of North America, as the result of climatic dissimilarities.

South America's sparse population is furthermore due to the fact that Europe has not yet needed South America as a home for overcrowded peoples. Canada is still giving away farms, the United States has scarcely ceased doing the same, and in the old settled commonwealths of the Eastern and Southern States hardly more than half of the available area is cultivated. The United States is still a comparatively empty country. The emigrating races of Europe, which have been chiefly the Teutonic, have found stable and friendly governments, fellowship of race, and familiar climate in the United States, Canada and Australia. These attractions were not offered by South America. Settlement there was impeded by the tropical climate of a large part of the continent, and by the fact that the most suitable districts for white colonization were on the inland plateaus, separated from the ocean by unhealthy lowlands which must be crossed by railroads before commercial relations could be established with the rest of the world. Under these conditions, an extensive occupation of the country has waited for corporate en-

terprise to provide the needed transportation facilities. There have been no large European emigrations except to Argentine and southern Brazil where the climate is similar to that of the temperate latitudes of North America, and where the governments have been fairly stable, and have provided the political prerequisites for industrial growth.

THE TRADE ZONES OF SOUTH AMERICA.

In discussing the industries and trade of South America, it is necessary to divide the continent into Trade Zones. The various countries do not form a satisfactory division, because in some cases two or three adjoining states have similar climate, resources, and trade connections. Nor is a separation of the continent into zones of latitude helpful, because very dissimilar regions are found in the same latitude. The shape of the continent and the lack of internal communication make it necessary to treat the Pacific and Atlantic sections separately, and each of these sections has a temperate and a tropic division calling for separate treatment. In the following discussion the continent has been divided into (1) The Temperate Pacific Section, (2) The Tropic Pacific Section, (3) The Temperate Atlantic Section, and (4) The Tropic Atlantic Section.

The Pacific sections are the regions under consideration in this paper, but at the close of the discussion a brief reference will be made to the two Atlantic sections for the purpose of calling attention to the effects which an Isthmian canal will have on them. From the standpoint of the world's trade, the Atlantic sections of South America are more important than the Pacific side, but as regards the traffic and effects of an Isthmian canal the western third of the continent is of greater consequence. The effect of the canal on the trade of the Atlantic region will be slight, but on the Pacific side the canal will change the routes and in some measure the destination and origin of the larger part of its foreign commerce.

Western South America includes the Pacific coastal strip, and also the Andean plateau, and reaches from the southern limits of the habitable part of the temperate zone northward well into northern tropical latitudes. The Republic of Chile, in the temperate zone, is as large as our New England and Middle Atlantic States with Maryland and the Virginias added. Northward in Peru and Bolivia the ranges of the Andes broaden so that in addition to the coastal plain, often sixty miles across there is an extensive plateau a thou-

sand miles long, and in places several hundred miles wide. On this broad highland is the Titicaca basin with a system of rivers flowing into a lake about half the size of Lake Erie, and furnishing hundreds of miles of navigable waterways.

INADEQUATE TRANSPORTATION FACILITIES OF WESTERN SOUTH AMERICA.

The Pacific frontage of South America has more than double the population and area of our Pacific coast states of California, Oregon and Washington. The western sections of the two American continents are, however, very differently situated commercially. Our Pacific slope has the advantage of seven trans-continental railroads; the Pacific coast of South America has but one and that is incomplete. The foreign commerce and to a large extent the domestic trade of the west coast of South America is dependent upon inadequate and circuitous water transportation. The building of the Panama railroad has been of comparatively small importance to the trade of South America. The costs of transhipment at the Isthmus, and the high freight rates charged, limit the use of this route mainly to passenger traffic and the freighting of articles that need quick transportation. Cheaper commodities take the longer route around the continent. A prosperous industrial growth requires transporting agencies that can profitably and cheaply move such commodities as coal, iron and other ores, grain, etc. This the Panama railroad cannot do, and such commodities, if moved at all, must go through the Straits of Magellan, or around the Horn.

The great distance that must be traversed by the ships passing between the commercial countries of the North Atlantic and the west coast of South America has caused the commerce of those countries until recently to be chiefly dependent upon the sailing vessel. The introduction of regular steam connection promises better transportation facilities for the future, especially after the canal shall have been completed. Callao, Peru, is now farther by steam from New York than is the South Pole, but an Isthmian canal will bring the city one thousand miles nearer to New York by steam than San Francisco will then be.

The present difficulties of transportation restrict travel, and thus prevent the people of the United States and Europe from becoming acquainted with the people and trade conditions of western South America. Commercial exchanges prosper only when knowl-

edge and intimacy break down mistrust, and reveal the commercial needs of the trading nations.

In Pacific South America generally, as in other Latin American countries, the difficulties of inland transportation are a great hindrance to industrial and commercial progress. Excepting a few lines of railroads, there are practically no means of communication in western South America save the pack mule. This state of affairs makes the commerce of the interior districts similar to that of Europe in the Middle Ages, when international trade was limited to silks and spices and other light commodities of high value that could be carried long distances by caravan, and to the few bulkier articles produced along the seacoast and navigable rivers. The inland districts of England, France, and Germany then had considerable populations, but each community raised its own food, made its own clothing, and knew little of the products of other countries. The improvements that have transformed the European countries have not yet had much effect upon the tropic section of Pacific South America. Only a small proportion of the population contributes anything to the foreign trade. The rest live in isolated communities, each of which is practically self-supporting.

DEPENDENCE OF WESTERN SOUTH AMERICA UPON FOREIGN CAPITAL AND LARGE ORGANIZATIONS OF CAPITAL.

The nineteenth century witnessed an enormous expansion of commerce throughout the greater part of the world, largely because industries developed in new countries by means of the capital that Europe had slowly accumulated through several preceding centuries. The foreign trade which South America now has is almost entirely the result of European investments. Foreign capital has worked the coffee plantations of Brazil, and built her railroads and those of Argentina. The flocks of Argentina are owned by Englishmen and Scotchmen, the nitrate works of Chile are in the hands of English and German owners, and the sugar plantations of Peru are the property of Americans and other foreigners.

The capitalistic development of western South America, particularly the northern part, has, however, not yet progressed very far. It has great stores of natural wealth, but the obstacles in the way of their utilization have not been overcome. Large organizations of capital are especially necessary in the Andean region and on the west coast. In Argentina, the European owner can cultivate his

grain and pasture his flocks in a level country watered by rainfall, but in Peru irrigation is necessary to agriculture. The building of a railroad across the level Pampas to carry away the wool and grain of Argentina is a very much easier task than building a line up the defiles of the Andes to tap the mineral wealth of the plateau. Operation on the east side can be conducted with moderate capital, but on the west side the large capitalist, the mining expert, and the complicated machine are necessary. The return to capital, however, promises to be liberal.

Foreign capital has made less headway than would otherwise have been made in western South America because of the frequency of political disturbances and civil wars. The deleterious effects of frequent revolutions and unstable political conditions are known to be great, and are felt even more by the merchant than by the capitalist who is engaged in mining, agriculture, or transportation. The manager for a strong corporation, which has for years operated a large sugar plantation in the Peruvian belt, reports that the per cent. of loss that has actually occurred from civil wars has been on the whole surprisingly small. The country, however, suffers greatly because capitalists are deterred from making investments.

The western part of South America has been lying idle while more accessible resources elsewhere have been levied upon. But a new era seems to be at hand. The constant tendency everywhere is to organize capital on a large scale, and it seems probable that the development of western South America will be undertaken by organizations of capital similar to those that are giving the United States its industrial preeminence. In fact a substantial beginning has already been made, and that beginning is responsible for the present importance of western South America to the world's trade. In 1899, Chile exported more tons of nitrate of soda than the port of New York exported tons of wheat. This nitrate was produced by large foreign corporations owning their own nitrate beds and reducing plants, the railroads to carry the product to the seacoast, and the piers and warehouses from which to ship it. In 1899, Peru exported 110,000 tons of sugar which had been produced by firms that could irrigate their plantations, install expensive machinery, build lines of railway to the port or to some main line, and, in some cases, the product was exported in the ships of the producers. By the increase of enterprises of this character, the west coast can double and treble the amount of her contributions to international trade.

The first step to be made in the direction of these changes will be in bettering the means of transportation by the building of railways, or starting industrial undertakings which include as a part of the enterprise, an improvement in the existing method of transportation. This will come about easier after the opening of an Isthmian canal, which will tend to quicken the industrial and commercial life of the west coast of South America. Cheaper freights will enable the commodities now exported to be marketed more cheaply, and other articles not now utilized will find their way into commerce. With the greater possibilities of securing freight will come new inducements to build railways and make other improvements in transportation. Railway materials and the machinery necessary for the equipment of industrial plants will be cheaper because of lower freight rates from the iron producing countries north of the Isthmus.

The supply of capital for South America will in the future come from the United States as well as from Europe. We have become large exporters of the iron and steel and machinery needed by new countries. Our increasing wealth and population will furnish money and men for industrial enterprises in foreign lands. American ownership and direction of railroads, mines and other enterprises in Mexico have been chiefly responsible for the industrial revolution in that country during the past twenty years, and for the accompanying expansion of her commerce, the chief part of which has been with the United States. This work is still going steadily forward in Mexico, but we shall probably welcome opportunities lying beyond the Isthmus of Panama.

DISADVANTAGES OF THE UNITED STATES IN TRADING WITH WESTERN SOUTH AMERICA. EFFECT OF THE ISTHMIAN CANAL.

With very few exceptions the industries of western South America may be classed as mining and agricultural. This is the case even in the seacoast regions engaging in foreign trade. There are, of course, local manufactures of various articles in the towns and villages, such work as is done locally in any community, but the nature of the resources of western South America is such that the region is likely to continue permanently in the extractive stage of industry, or at least until a period too remote for consideration here. Pacific South America is now but half of an industrial unit, the other half, the manufacturing complement, is in Europe and the United States. Each one of these industrial half units needs better facilities for

marketing its produce in the other. One important service of an Isthmian canal will be to bring these separated commercial and industrial complements into closer relation.

The west coast of South America bears a relation to the manufacturing centres of Europe and the United States similar to that which Montana, Colorado and Texas, with their raw products, bear to the manufacturing States of the East. The countries of the North Atlantic need and are buying the export products of the west coast of South America—the nitrate and the ores of copper, silver and gold, the grain, sugar, cotton, cocoa, coffee. wool, hides, rubber and woods. In return for this export these South American republics are importing from many countries, but chiefly from the United Kingdom, all kinds of manufactures, from steel rails to jewelry and fine clothes. Both parties will be benefited by increasing this trade. The production of raw material will be stimulated no less than the production of manufactures. For any gain that comes to South America, the rest of the world must receive an accompanying or complementary advantage.

The United States will derive especial advantage from the shortening of the roundabout path of this large and increasing commerce. Because of the present route around the continent, the trade of the west coast is mainly with Europe; but on the opening of the canal there will be a change of front toward the United States. Both European and American traders will have greatly improved opportunities, but the larger relative improvement will come to the east coast of North America. Our ports will then have from 2,000 to 3,000 miles advantage over Europe in the journey to the west coast, whereas at present the distance from New York and the ports of the English Channel to that section of the world are nearly equal, the southern cities of Europe having a slight advantage over the ports of the United States. Nearly all of South America lies east of North America. The meridian of Washington is that of Callao, on the coast of Peru. Antofagasta and Iquique, the chief nitrate ports of Chile, have the longitude of Boston. Valparaiso is 71° 40′, west longitude, and New York 74° .03′. The eastern point of Brazil lies 2,600 miles east of New York and is equidistant from New York Bay and the English Channel.

The sailing vessels bound from New York for the west coast of South America must go eastward nearly to the Canaries so as to be able to take advantage of the trade winds and get past Cape St.

Roque on the coast of Brazil. The European sailer goes directly past the Canaries and has an advantage of ten days over the American in a voyage to any part of South America, south or west of the eastern point of Brazil. For many decades our direct commerce with South America has been chiefly by sail and we have competed with Europe under most unfavorable conditions. The small part of our trade that has not gone by sail has gone by steamers to Panama for trans-shipment to the two lines of steamers going down the west coast. These lines have combined to keep the rates at such a figure that for most of the time during the last thirty-five years it has been cheaper to ship American goods to South America via England or Germany. It has often cost the American shipper from thirty to fifty per cent. more to send freight 3,500 miles direct to western South America by Panama than to send it 14,000 miles indirectly by way of Europe. Shipping around the Horn by sail is such a slow and irregular means of reaching the markets as to prevent the development of a satisfactory commerce in these modern times when expedition is the order of business. Our share in the trade of the west coast of South America has not been gratifying to national pride; indeed, we have done little more than to sell in those countries the commodities that they could not secure elsewhere. Europe has taken nearly all of their exports and supplied them with most of their imports.

Since 1890 two American companies have beeen running chartered British vessels around to Guayaquil, and during this period the value of our exports to the west coast has increased sixteen per cent.; this, however, is less than one-third the rate of the increase of our total exports. Fortunately the steamer is rapidly taking the place of the sailing vessel. In 1890 steam vessels carried, largely via Panama, thirty-six per cent. of our exports to the countries of western South America. In 1900, eighty-one per cent. of our exports to those countries went by steam, a gain of two hundred and twenty-five per cent. in the proportion carried by steam.

The starting of the lines of steamers from New York has not, however, given our manufacturers an even chance with those of Europe. American merchants and consuls on the west coast complain that the steamers from New York charge higher rates than those from Europe, and nearly as high as the Panama lines. Nevertheless, these steamers always leave New York full loaded with export freight and the profitableness of the business is attested by the

frequent addition of more vessels to the fleets. This suggests what may be expected to occur when the Isthmian canal and more lines of steamers give us shorter and better means of communication with Pacific countries.

We have a thriving trade with the American countries near to us. Fifty-nine per cent. of Canada's imports come from the United States. The ocean route to Mexico is longer than to Canada, and the railroad connections over the land frontier are much less satisfactory, yet we furnish forty-nine per cent. of the Mexican imports. The northern countries of South America are about 2,000 miles from New York, but we have fairly good steamship connection and a growing trade, Colombia and Venezuela drawing about thirty per cent. of their imports from this country. In contrast with this, however, the United States furnishes less than ten per cent. of the imports into the countries of the west coast of South America; and our trade there has increased slowly at a time when the growth of our exports as a whole has been rapid. Under the present adverse conditions our share in the trade of the west coast of South America is only one-third as great as it is in the South American countries bordering on the Caribbean Sea, one-fifth as great as in Mexico and only one-sixth of the percentage which we control of the trade of Canada. An Isthmian canal, and the lines of communication that it will open may be expected to give this country a larger share in the trade of the Pacific.

This conclusion is strengthened by some incidents in the history of the foreign trade of Chile. In years past, the British share of that trade was greater than it is at the present. Her commissioner sent in 1898 to investigate the cause of this decline, reported as the first cause that British merchants did not secure as good freight rates for their commodities as were obtained by their continental rivals, the difference in favor of Antwerp and German ports being sometimes twenty-five per cent. It was found that English merchants sometimes sent British goods to those ports for re-shipment to Chile. The lower rates from Germany were due to the nitrate trade. Germany being the largest importer of Chilean nitrate of soda, the ships returning from that country to Chile could offer the best rates on outgoing freight, and this was one of the causes that had enabled the German merchant to build up a large South American trade.

A similar advantage will come to the traders of this country when the canal has been opened. By that time the United States

will have a larger consumption of nitrate, our vessels will go directly down the South American coast, and the favorable shipping facilities that are now giving Germany an advantage over the United Kingdom will be possessed in a more marked degree by American merchants. Moreover, it is probable that the vessels en route from Europe to South America will aid our exporters by calling at our ports for coal and other cargo.

The advantage of cheaper transportation is already shown in the export cotton trade of the United States to Chile. At certain times nitrate ships returning to South America offer very favorable rates from New York, and exporters then dispose of cotton cloth in large lots at Chilean ports, thereby securing a trade which the regular conditions of freight would not permit.

The future trade between our east coast and the west coast of South America will have the advantage of a heavy traffic both ways, a phenomenon rarely met with in international commercial movements. Our east coast trade with Europe consists mainly in the exchange of large quantities of agricultural and other heavy produce for a small quantity of manufactured products, and this necessitates a large ballast movement westward across the North Atlantic. Our exports from New York to Australia are but partly balanced by the small return trade. Our exports to the Orient of iron, cotton and foodstuffs are exchanged for light curios, tea and mattings. Our trade to South America is certain to give rise to an increasing exportation of articles similar to those we are sending to China and Australia with the probable addition of coal, and these commodities will be exchanged for Peruvian sugar, Chilean nitrate, ores and heavy produce, so that vessels will readily secure cargoes both ways. This will be an advantage both to the steamship companies and the shippers.

(To be continued.)

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EDITORIALS

THE west coast of South America is so little known to us that it is very gratifying to be able to offer to our readers the very valuable contribution to the subject, the first installment of which appears in this number of the JOURNAL. Professor Johnson has spent two years on the Isthmian Canal Commission as an expert in commerce and transportation, studying the effects which the canal will have upon our relations with the world at large. In no place will relations be so revolutionized as in the regions discussed in this paper.

The substance of this article will appear as part of the report of the Commission. The maps which accompany the report will be the most valuable recent additions to the field of economic geography.

When it is known that this report embodies the results of the careful work of a large board of highly trained men, chosen for their fitness for such labors; that it will cost the government $72,000 merely to publish the report; that the edition is limited to 6,000 copies, and that these are practically all placed, making it impossible for teachers at large to take advantage of them, it will be seen that we are very fortunate in being able to secure for our readers in advance of its final publication so authoritative a treatment of a region soon to be so prominent in our interest, in the capacity of near neighbors in a commercial sense.

ONE of the most encouraging signs of the times in reference to secondary school physical geography is the recent action of the College *Entrance Examination Board* of the *Middle States* and *Maryland* in placing physical geography among the entrance subjects in which examinations will hereafter be given. The Board prints an outline of the field on which the candidate will be examined, which outline follows the suggestions of the Sub-Committee on Physical Geography of the Committee on College Entrance Requirements of the National Educational Association. It is expected that the candidate may be able to secure the necessary material from either of the better physical geographies that have been written from a modern standpoint, that is, from the well-known books of Tarr, Davis, or Dryer. An important part of the outline as printed

by the Board is a series of suggested laboratory exercises, forty of which must be performed by the candidate, and the results presented in a certified notebook at the time of the examination.

This action by the College Entrance Board ought to bring about a great advance in the character of secondary physical geography, and ought to do much toward establishing a certain uniformity of advanced method in secondary work. The examiners in the subject for 1902 are Professor Albert P. Brigham, of Colgate University, first chairman of the National Educational Association Committee mentioned above; Professor William North Rice, of Wesleyan University, second chairman of the Committee; and Mr. Frank Carney, of the High School, Ithaca, N. Y. The full report of the College Entrance Board may be obtained from the secretary of the Committee, Professor Thomas S. Fiske, Sub-station 84, New York City.

FOR several years the *Journal of School Geography,* one of the predecessors of this JOURNAL, has been sent regularly to the members of the Geographical Association of Britain, which has been endeavoring in a practical way to improve the quality of the geography teaching in the schools of England and Scotland. The Association has now advanced in its work so far as to be able to establish a quarterly journal of its own, called *The Geographical Teacher,* which will be devoted to the problems of geography teaching. *The Teacher* is edited by A. W. Andrews, M.A., one of the leading workers in the Association, and Dr. A. J. Herbertson, one of the associate editors of this JOURNAL, and lecturer in Regional Geography in the University of Oxford.

The first number of *The Geographical Teacher* is extremely attractive in content, in typography, and in general appearance. Though the articles are mainly for the use of teachers in Britain, there are certain articles of general interest to the teachers of America. By an arrangement made between the two journals, it will be possible for us to present from time to time extracts or reprints from *The Geographical Teacher,* that are of general interest. The new periodical is an encouraging sign of geographical progress in Britain, and it is to be hoped that it may receive encouraging support.

The Teacher should be in every pedagogical and geographical library in this country, and it is hoped that arrangements may be made whereby *The Teacher* may be supplied to subscribers to this

JOURNAL at reduced rates. Those desiring to subscribe should address Richard E. Dodge, at the address given on the cover of the JOURNAL.

GEOGRAPHY CURRENT

GEODESY

The Russo-Swedish Degree Measurement.—A third summer has been spent by Russian and Swedish geologists in Spitzbergen, and although good progress has been made with the field-work necessary for the measurement of an arc of the meridian, the whole labors have not yet, as had been hoped, been completed. The Russian section, as has been announced in *Petermann's Mitteilungen*, was able before sailing south, to effect the determination of all points in the triangulation which fell to its share; but the Swedish party which has worked throughout in the north of the group, and has therefore met with more hindrances from the ice, has been unable to complete the whole program. The north coast was so blocked by ice that it was found impossible to reach the sphere of action from the west, and only after much delay could it be gained by a circuitous route from the east. The work being incomplete it will be necessary to return once more in 1902, if this important work is to reach a successful conclusion.—*Geographical Journal.*

Magnetic Observatories.—According to *Science* the United States Coast and Geodetic Survey has established four *magnetic observatories*, coöperating in the international magnetic work, and to continue during the period of Antarctic exploration, viz.: One at Cheltenham, Md., near Washington, D. C., another at Baldwin, near Lawrence, Kansas, a third at Sitka, Alaska, and a fourth near Honolulu, Hawaiian Islands.

PHYSIOGRAPHY

Subsidence of the American Isthmus.—There is no question of the fact that the entire American Isthmus from Salinas bay in Mexico to the south side of Darien is subsiding slowly; while south of Darien on the Pacific ocean side at least to the Straits of Magellan there is a corresponding elevation of the land, but much too small annually to be generally noted. There was a time evidenced by the

fiords on the eastern coast of Nicaragua, southern and southwestern Cuba and western sides of the Antilles, when Nicaragua was a continent extending eastwardly to at least the east side of the Antilles. —J. CRAWFORD in *The American Geologist.*

The Physical Geography of the Red River Valley.—Under this title D. B. Dowling, in the *Ottawa* (Canada) *Naturalist* for August, 1901, gives an interesting summary of the physical history of the Lake region of the Province of Manitoba. The evidences of the changes in elevation are given and the effects on the present topography and conditions of life thus produced are concisely but clearly stated. Two cuts of relief maps made by Mr. Dowling illustrate the paper. The article should be in the hands of teachers of physical geography, and if the models used in illustration are obtainable they will form a valuable acquisition to the equipment of a geographic laboratory.

J. A. D.

CLIMATOLOGY

Progress in the Weather Bureau.—The annual report of Professor Willis L. Moore, Chief of the United States Weather Bureau, tells if improvements made during the past year. Extensive experimentation has been carried on in wireless telegraphy, and installations are now at work along the coasts of Virginia and North Carolina.

Meteorological reports are now received and published daily from the British Isles, the Continent of Europe, and the Azores. Forecasts are published for eastward-bound steamers for the first three days out.

During the crop season there were last year 14,000 persons reporting weekly to central points on the effect of weather on the crops in their respective localities. The rural free delivery has carried the daily weather predictions to nearly 42,000 families.

The Highest Balloon Ascent.—On July 31, 1901, Drs. Berson and Süring, of the Berlin Meteorological Institute reached the highest altitude yet gained by man, the record being 10,300 meters (33,790 feet), or about 6.4 miles. At this height one of the observers lost consciousness, and the other opened the valves and descended, he losing consciousness in so doing. At an altitude of 16,000 feet, nearly an hour later, consciousness was regained and observations

continued. At the highest altitude the thermometer read 202 mm. The freezing point was reached at 12,470 feet; and at 33,600 feet it was —40 degrees (C. or F.).

HYDROGRAPHY

River Profiles.—An interesting and valuable publication of the Department of Hydrography of the United States Geological Survey on the Profiles of Rivers in the United States, by Henry Gannett, has just been published and is now available for distribution. It embodies within a hundred pages the leading facts of about one hundred and fifty of the most important rivers and streams of the country, noting their length, drainage area, the location of water power in their courses, their peculiarities of flow and the nature of their drainage basins.

The rivers selected are those which are the largest in size and bear most directly upon the varied interests of the country, such as the Connecticut, Hudson, Susquehanna, Ohio, Potomac, Mississippi, Missouri, Platte, Colorado, Sacramento, Columbia and others. The figures for the tables showing height above sea level and fall per mile were collected from various sources. Some were obtained from the report of the Chief Engineer of the U. S. Army, some from railroad companies when their lines cross the streams and some from the Atlas Sheets of the U. S. Geological Survey.

In the case of such rivers as the Connecticut, Susquehanna, Mississippi and Colorado, where the surrounding country is, in part or whole, of peculiar physiographic interest, very excellent and vivid descriptions of its leading physical characteristics are given which add to the interest and render it valuable from an educational standpoint in geographic and physiographic instruction.

The pamphlet is the result of much careful work and is the first attempt to collect and compile this information in its present form.

PHYTOGEOGRAPHY

Sugar-cane.—The cultivation of sugar-cane probably began in the Ganges delta, and spread much later to China; it passed to North Africa and southern Europe through the Arabs, and was carried to America by Columbus in 1493.

Sugar-cane needs phosphoric acid and above all silicic acid and potash in the soil, and so needs manuring and irrigating. It is a dry

soil plant, which cannot endure stagnant water, but requires heat and plenty of watering. The vegetation period is usually about one and a half to two years, but is shortened in North America to ten months. Owing to low temperatures its cultivation closes in the southeast of the United States and China at 34°N., in Brazil at 30°, but in Spain at 39°. In Java it is not cultivated for sugar-making above 550 metres, but in Nepal it grows as high as 1,327 m., in the Nilgiri hills to 1,524 m., and in Mexico, Columbia, and Peru to 1,800 m. It does not flourish in Kashmir, but Sultan Babur reared it in Kabul at 1,900 m. In 1896–97 at least 1,317 (probably 4,000) million kilograms of sugar were prepared from the cane, and 4,747 from the sugar beet. Germany, which produces more sugar than any other country at present, made a greater quantity of beet sugar than the whole of America made of sugar-cane.—Professor Kirchhoff, in review in *Geographische Zeitschrift,* of Kruüger's 'Das Zuckerrohr und seine Kultur,' Magdeburg, 1900.

A Bureau of Plant Industry has been organized in the United States Department of Agriculture. It has unified the work in plant physiology and pathology, botany, agrostology, pomology, and the experimental gardens and grounds, including the experimental farm at Arlington. Our government is doing magnificent work along all these lines, and is the pride and envy of the nations across the sea.

ZOOGEOGRAPHY

Mosquitoes and Yellow Fever.—In the year 1901 active war has been made upon mosquitoes in Cuba, and as a consequence the death rate from yellow fever has been so far reduced that whole months have elapsed without a single death in Havana, a record never before known in the history of the city. Now, at the beginning of 1902 the death rate in that city is lower than in some of our larger cities of the north.

The Bureau of Animal Industry of the United States Department of Agriculture, in the year 1901 inspected 37,000,000 slaughtered animals. Of the 5,000,000 cattle inspected, only one-fourth of one per cent. were condemned; of the 6,500,000 sheep, one tenth of one per cent.; and of the 24,000,000 hogs one third of one per cent. Over 1,500,000 inspections were made in the control of Texas fever; for scabies in sheep, 8,000,000, and over a million sheep were dipped.

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To combat 'black leg,' or anthrax, over 1,500,000 doses of vaccine were distributed. The loss from this disease has been reduced from 10 per cent. to 1 per cent. In the control of tuberculosis in cattle 44,000 doses of tuberculin were supplied, and for glanders in horses, 7,000 doses of mallein.

ANTHROPOGEOGRAPHY

The Population of the World in 1901.—The Census Bureau has issued a report on the population of the entire United States, including outlying possessions in the census year 1900. There is a total population of 84,233,069, itemized as follows:

Continental United States, or United States proper, 75,994,575; Philippines, 6,961, 339, being the estimate of the statistician of the Philippine Commission; Porto Rico, 953,243; Hawaii, 154,001; Alaska, 63,592; Guam, 9,000; American Samoa, 6,100; persons in the military and naval service of the United States outside of the territory of the United States proper, 91,219.

In the words of the report, "the total population of the United States at the close of the nineteenth century was about eighty-four and a quarter millions. As the population of the United States at the beginning of the century was about five and a third millions, the nation has grown nearly sixteen-fold in 100 years.

"There are but three countries which now have a greater population than the United States, viz., China, the British Empire and the Russian Empire. China and the British Empire have each of them probably between 350,000,000 and 400,000,000, or together nearly one-half of the total population of the earth. The Russian Empire, with about 131,000,000 people, has more than half as many again as the United States, and has been increasing during the century just closed with greater rapidity than any other European power. Its growth, like that of the United States, has been partly through the natural increase of its population and partly through great accessions of territory. It had about 38,800,000 people in 1800, and has increased more than three and a half times during the nineteenth century.

"France, including its dependencies, is the fourth country of the world in order of population, and has about eighty-three and two-third millions, or almost the same number as the United States. Of these, over 25,000,000 are in African dependencies, nearly 17,000,000 in Asia, and 2,000,000 in Madagascar. These five most

populous countries together include over two-thirds of the estimated population of the world, which is placed by the best authorities at between 1,500,000,000 and 1,600,000,000."

ECONOMIC GEOGRAPHY

The Mineral Products of America in 1900.—The Geological Survey report on mineral resources, which has just been issued, gives as the total value of our mineral resources for 1900, the largest sum in our history, $1,067,633,606—a gain of nearly ten per cent. over the preceding year. Iron and coal alone made up over one half of this, having a combined value of about $566,000,000. The total iron output is 27,553,161 long tons, the Lake Superior region giving 20,564,238 long tons, or 75 per cent. of this total for the country, while the Mesabi range in Minnesota alone produced 30 per cent. of the total. The total value of the iron in 1900 was $66,590,504, a gain of 90.26 per cent. over the preceding year. The average price was $2.42 per long ton, a gain of 70.4 per cent. over 1899. Of the 19,059,393 tons shipped from Lake Superior, only about one fortieth went by rail. About one sixth of the Superior ore went to Chicago or stayed in the West, while five-sixths went to the lower ports,—and about one-half the Superior output went to the three ports, Cleveland, Ashtabula and Conneaut.

The yield of gold for the year, including Alaska, was $79,171,000, a gain of about 10 per cent. over 1899. The silver output was valued at $35,741,140.

In coal the United States is by for the world's largest producer, largely increasing her lead over Great Britain. Our yield for 1900 was 269,881,827 short tons, valued at $306,891,364, an increase of nearly 6 per cent. over 1899, the great strikes in the anthracite and Cumberland regions cutting down the yield very materially. Only about 3 per cent. of the total yield of coal was exported.

The output of crude petroleum exceeded all records, on account of new wells opened in Texas, California and other places, but most of the Texas development has occurred in 1901. Over 91 per cent. of the output in 1900 came from the Appalachian and Ohio-Indiana fields.

In the Fiscal Year of 1901 the agricultural exports of the United States reached a value of over $950,000,000, which was 65 per cent. of all the merchandise sent abroad during the year. Great Britain

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is the largest buyer, Germany, France and the Netherlands coming next in the order named.

POLITICAL GEOGRAPHY

Expensive Empire Building.—The Anglo-Boer war has been going on just two years and three months. And this is what it has cost Great Britain up to this time:

Total deaths from all causes	19,430
Total sent home as invalids	64,330
Total expenditures to end of fiscal year	$750,000,000

Even if the conquest of the two Republics were complete to-day, Great Britain would have paid nearly $5,000 per square mile for the 163,500 square miles of the annexed South African territory, and more than one British soldier has been killed, maimed or invalided for every Boer soldier put in the field.

Perhaps this is not a price that "staggers humanity," but it is certainly one that staggers the British people.—*New York World.*

GEOGRAPHY TEACHING

The Des Moines Geographic Exposition.—Perhaps nothing more stimulating to the teaching of scientific geography has occurred in the west than the exhibition, which was held concurrently with the meeting of the Iowa State Teachers' Association, December 27–30, 1901, under the auspices of the science teachers of the State, and under the management of Professor W. H. Norton, of Cornell College, and Mr. A. W. Brett, of the West Des Moines High School.

At a meeting of the science teachers the subject of physiography was given special prominence. Dr. Samuel Calvin delivered a lecture on the Ice Age in Iowa, illustrated with 100 views of typical Iowa land forms; and Professor Norton discussed the topic of Helps in Physical Geography, with direct reference to the exhibits.

The exhibits included the Harvard geographical models, the Harvard geological set, with its series of accompanying photographs and descriptive texts. Howell, of Washington, exhibited the new set of large models of the continents, two of the United States and one of the Chattanooga district. The large Jones relief globe, and the new Klemm relief maps were shown. No exhibit in this section attracted more attention than that of students' work from the laboratory of Cornell College showing methods of building models

in different materials. For example, a relief model of Crater lake, Oregon, built of cardboards on which contour maps had been pasted. Another represented a drumlin area in Wisconsin executed in putty, the vertical control being obtained by steel pegs driven to give heights along contour lines of base map. One of the Harrisburg sheets showed Appalachian structure. There was one of Great Britain, and one an exercise model, in solution of a given problem, showing river piracy with concomitant capture of obsequents. As an example of a preliminary sketch used in making such a model, there was shown a clever contour map of an ideal glaciated valley, showing cirques, lateral hanging valleys, broken bed, over-steepened sides, all in strong contrast with the lower unglaciated reach of the valley.

The map section was well filled, various firms, and departments of the government being represented.

The section devoted to instruction by pictures was perhaps the largest exhibit of the kind ever shown in this country. About a thousand lantern slides were shown. Lanterns were furnished by Thompson, of Boston, and the McIntosh Co., of Chicago.

A very complete display of recent text-books and of periodicals useful in geography teaching formed a pleasant feature of the exhibit.

GEOGRAPHIC LITERATURE

BOOK REVIEWS

Lehrbuch der Meteorologie.—Julius Hann. Royal 8vo. Leipzig, 1901. Pp. 805. Pls. 8. Charts 15. Figs. 111.

Dr. Hann, professor of cosmical physics in the University of Vienna, and for many years editor of the *Meteorologische Zeitschrift*, is the leading meteorologist and climatologist of the world. On account of his rich and varied experience as a teacher, as investigator, and as editor, he is better fitted than anyone else to write a text-book of meteorology. The new "Lehrbuch" is really more of a treatise than a text-book. It covers the whole field of meteorology, and because of its wide scope, its clearness of presentation, and the careful selection and great number of bibliography notes which it contains, the book is an invaluable one to every student and teacher of meteorology. It can be used only as a reference book by teachers in secondary and high schools; but for a thorough college course in meteorology it would serve admirably as a text-book. Hann's "Lehrbuch," therefore, does not replace such text-books as Davis's Elementary Meteorology or Waldo's Elementary Meteorology. Its greatest usefulness will be as a general reference book, and for this purpose it will serve

admirably, because it brings the discussion of every subject down to the very latest date. The use of the "Lehrbuch" will save many an hour which would otherwise be spent in looking up references in scattered publications. As a bibliography alone, this volume is worth more than its cost.

An English translation of the "Lehrbuch" is very much to be desired, for this magnificent book would then have a much wider range of usefulness than is now possible. We understand that such a translation has already been begun by the meteorologist in this country who is best of all fitted for this task. With an English translation of the "Lehrbuch," and one of the same author's "Handbuch der Klimatologie"—the latter translation already completed, and to be published during the present year—English-speaking teachers of geography will be well equipped for any instruction which they may find occasion to give in meteorology and climatology.

R. DEC. W.

The World and Its People.—Book X. The South American Republics. Markwick and Smith. Silver, Burdett & Co., 1901. Pp. xiv + 348.

The many friends of the well-known series of geographical readers, "The World and Its People," will welcome the recent addition which has been made in the publication of "The South American Republics."

In aim this volume is similar to that of the earlier publications of the series, representing that aspect of a country which finds no place in a truly scientific study of geography, but which is generally recognized as essential to a live knowledge of places and peoples.

The style adopted is effective. Many of the descriptions are strikingly realistic, and cannot fail to make a lasting impression. Such descriptions are supplemented by frequent quotations from books of travel, magazine articles and letters, the authors having succeeded in imparting the freshness and vigor of eye-witnesses to their work.

An unusual feature in a "reader" and one to be strongly endorsed is the appreciation of the fundamental control which physical surroundings exercise upon the life of a people both in a large and a small way. The historical sketches, too, are a valuable feature of the work, though a less detailed treatment would seem advisable.

It is to be regretted that with so much to recommend it, the material composing the work should not have been more carefully arranged. In several instances the chapters are entirely lacking in system; the appearance, the manners, the customs of the people; the physical features, the flora, the fauna of the countries are discussed so informally that before one topic is completed another, not rationally related, is considered, an abrupt return being subsequently made to the original topic.

The pictures and maps are perhaps the least satisfactory feature of the book. The former, while well chosen, lack clearness and are therefore generally ineffective; the latter are few in number, are on too small a scale to represent detail, and tend to give an incorrect impression of the relief of the region mapped.

Though the book still leaves something to be desired, it will be found a decided help in the treatment of South America, and will without doubt fulfill its aims—that of "awakening a deeper interest in the Republics of the South."

C. B. K.

NEWS NOTES

THE executive committee of the *Seventh Geographical Congress* with Baron von Richthofen, of the University of Berlin as chairman, has accepted the invitation of the National Geographic Society of Washington to hold the next Congress at Washington in 1904. This will be the first meeting of the International Congress to be held in the New World, and will be an event of the largest import to geography in America. Supplementary sessions may be organized under the auspices of the Geographic Societies of Philadelphia, New York, Chicago and San Francisco, and many excursions will be planned to various points of interest in the far West as well as in the East.

A TELEGRAPH line now connects the Klondike with the world at large. It has been constructed by the Canadian Government, extends from Vancouver to Dawson (2,200 miles), and lies wholly in Canadian territory.

PROFESSOR FERDINAND FREIHERR VON RICHTHOFEN, who holds the chair of geography at Berlin, has received from the German Emperor the gold medal for science for his services in supplying the German expedition to China with valuable maps.—*Science.*

MR. JOHN HYDE has resigned the editorship-in-chief of the *National Geographic Magazine,* a position he has held for six years. He is succeeded by Mr. Henry Gannett, Chief Geographer of the United States Geological Survey.

AN association of American and Canadian capitalists has undertaken, by agreement with the Province of Quebec, to spend $2,000,000 in the manufacture of wood pulp on the Labrador coast, using a waterfall there for the generation of electric power, which will be transmitted by wire ten miles to the mills.

DR. HENRY B. KUMMEL, who has been for some time Acting State Geologist of New Jersey, has been appointed State Geologist, to succeed J. C. Smock, resigned.

ACCORDING to *Science,* Dr. Sven Anders Hedin, who is now returning from his trip of exploration in Gobi and Tibet, has informed King Oscar that he was attacked by Tibetans, losing all his collections and much of his caravan, though he saved his notes.

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THE daily papers announce the departure of Dr. Ales Hrdlicka, of the American Museum of Natural History, New York City, for a fourth anthropological expedition among the Indians of the southwestern United States and northern Mexico. In his previous trips Dr. Hrdlicka has studied the physical characteristics of the Navajos, Utes, Apaches, Moquis, Zunis, and other Pueblo tribes. The principal tribes that will be studied this year are the Pimas, Papagos, Yaquis, Mayos, Tepehuanes, Coras, Aztecs, and Tarascos. Dr. Hrdlicka goes to the field under the auspices of the Hyde Exploring Expedition, of the Museum.

PROFESSOR CHARLES T. MCFARLANE, for many years Professor of Geography at the State Normal School, Ypsilanti, Michigan, has been made principal of the State Normal School, Brockport, N. Y.

DR. JOHN GIFFORD, of the New York State College of Forestry, in a recent article in the *School Review*, pleads for more attention to forestry on the part of the American people. He urges that the fundamental principles of forestry be incorporated in the high school courses in physical or commercial geography, though he distinctly states that forestry should not receive an amount of attention beyond its due share, as compared with other parts of the course.

A BILL has been reported in the House of Representatives authorizing the Secretary of Agriculture to purchase land for a McKinley National Park, not to exceed four million acres in extent, and to lie within the confines of West Virginia, Virginia, North Carolina, South Carolina, Georgia, Alabama or Tennessee.

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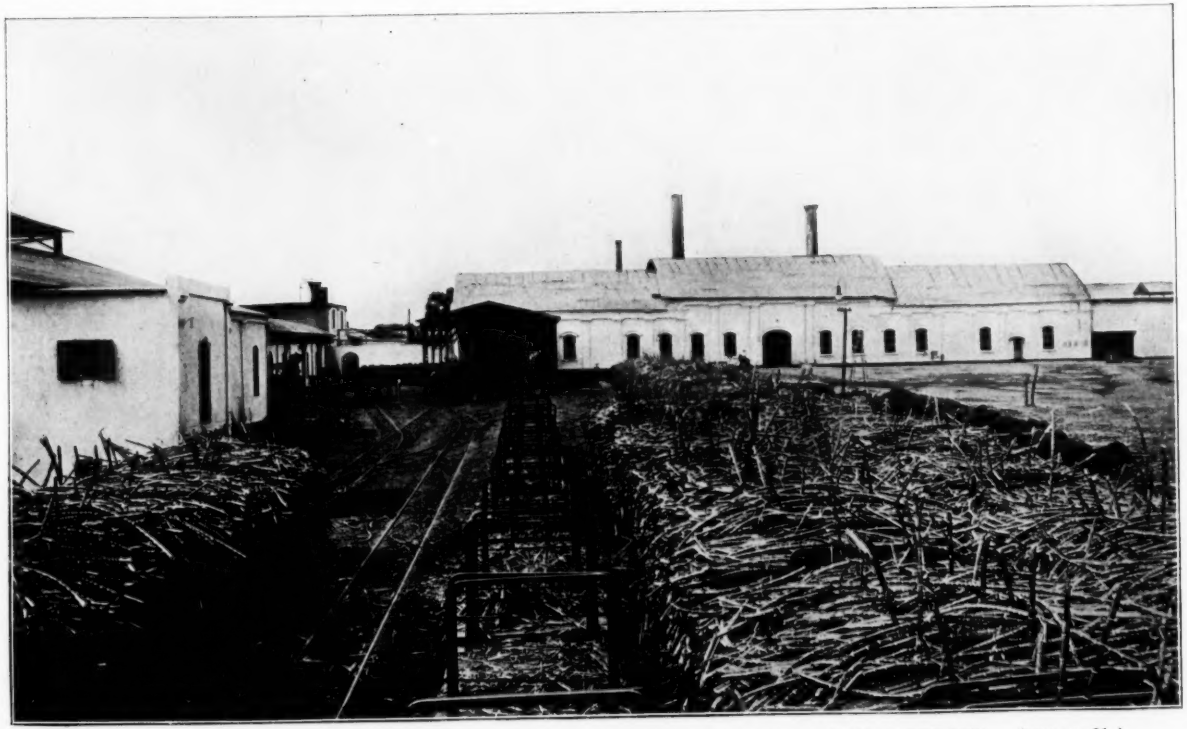

FIG. 1. A LARGE SUGAR HACIENDA IN PERU. THE CANE IS BROUGHT DOWN BY RAILWAY TO THE MILL. (SEE P. 61.)